

REMARKS

In response to the Office Action mailed April 15, 2009, the new Assignee ("Nuance Communications, Inc.") respectfully requests reconsideration. Claims 1-12 were previously pending in this application. By this amendment, claims 1-10 have been amended and claims 11 and 12 have been canceled without prejudice or disclaimer. Claims 13-20 have been added to further distinguish Applicant's contribution to the art. As a result, claims 1-10 and 13-20 are pending for examination with claims 1, 8, and 10 being independent claims. No new matter has been added.

I. Rejections Under 35 U.S.C. §102

The Office Action rejects claims 1-12 under 35 U.S.C. §102(b) as allegedly being anticipated by U.S. Patent 5,586,192 ("De Bijl"). The Assignee respectfully traverses these rejections.

A. Overview of Embodiments

Audio signals received by voice recognition systems often comprise background noise and other noise signals in addition to a speech signal (Specification, [0006]). When processing the audio signal, it is desirable to detect the noise signals, so that they may be reduced relative to the speech signal (Specification, [0006]). Applicants have recognized that detecting "clicking" noise signals that occur during a relatively short time span, and which may occur in the immediate proximity of the speech signal are particularly hard to detect (Specification, [0007]). To this end, embodiments of the invention are directed to methods and apparatus for detecting noise signals in digital audio data.

In some embodiments, a digital audio signal is divided into a plurality of time-based sections (e.g., 5-millisecond segments), and the amount of energy in each section is determined and compared to an energy threshold value (Specification, [0039]-[0041]). Detection of noise signals in the digital audio signal is determined based, at least in part, on the number of "high-energy" sections that have energy content greater than the energy threshold value and the number of preceding and/or following sections, located relative to the high-energy sections, which have energy content less than the energy threshold (Specification, [0050]). For example, a noise signal in the

digital audio signal may be detected when the number of successive high-energy sections is at least 3, the number of preceding sections having energy content less than the energy threshold is at least 9, and the number of following sections having energy content less than the energy threshold is at least 30 (Specification, [0050]). Once a desired noise pattern is detected in the digital audio signal, the high-energy sections may be corrected or removed, resulting in an output audio signal that has reduced noise characteristics (Specification, [0081]).

The foregoing summary is provided to assist the Examiner in appreciating some applications for various aspects of the invention. However, this summary may not apply to each of the independent claims, and the language of the independent claims may differ in material respects from the summary provided above. Thus, the Assignee respectfully requests that careful consideration be given to the language of each of the independent claims and that each be addressed on its own merits, without relying on the summary provided above. In this respect, the Assignee does not rely on the summary provided above to distinguish any of the claims over the prior art. Rather, the Assignee relies only upon the arguments provided below.

B. Overview of De Bijl

De Bijl is directed to a system and method of detecting interference pulses in a sampled audio signal (De Bijl, abstract). The system of De Bijl analyzes a sampled audio signal using overlapping frames having a fixed number of samples (e.g., 31 samples) (De Bijl, col. 2, lines 58-62). Each sample of the frame currently being analyzed is held in a memory cell of a shift register having N memory cells, where N is the number of samples in the frame (De Bijl, col. 4, lines 36-54). Each of the memory cells in the shift register is connected to a respective comparator which compares the signal value of the sample to the central signal sample value (e.g., when $N = 31$, each sample is compared to sample 15 in the frame), and outputs a logic one if the sample has a value greater than the central signal sample and a logic zero if the sample has a value less than the central signal sample (De Bijl, col. 4, line 63 – col. 5, line 4). For each frame, the number (G) of comparator outputs having a logic one value is compared to a threshold value (N_0), and a pulse is output when $G < N_0$ to indicate that the central signal sample is an interference pulse (De Bijl, col. 5, lines 5-11, lines 43-47). After analyzing a frame, the samples in the memory cells of the shift

register are shifted by one position, and the comparison process is repeated using a new central signal sample (De Bijl, col. 5, lines 47-52).

C. De Bijl Fails to Disclose All Limitations of Each of Independent Claims 1, 8, and 10

i. Independent Claim 1

Claim 1 as amended recites, “detecting, among the plurality of successive signal sections, at least one high-energy signal section having an energy content greater than the energy threshold, wherein the at least one high-energy signal section has at least one preceding signal section having an energy content less than the energy threshold and at least one following signal section having an energy content less than the energy threshold; **counting a first quantity of the at least one preceding signal section, a second quantity of the at least one high-energy signal section, and a third quantity of the at least one following signal section...** (emphasis added).”

De Bijl fails to disclose or suggest these limitations of claim 1.

The Office Action asserts that De Bijl discloses detecting “the occurrence of at least one high-energy signal section...having an energy content above the energy threshold..., and the occurrence of at least one signal section...preceding...the at least one high-energy signal section and having an energy content below the energy threshold..., and the occurrence of at least one signal section...following...the at least one high-energy signal section and having an energy content below the energy threshold...” and counting “a quantity of signal sections...that precede...the at least one high energy section...and a quantity of high-energy signal sections and a quantity of signal sections...that follow...the high-energy signal section...” at column 2, line 29 – column 3, line 17 (Office Action, pages 2-3). The Assignee respectfully disagrees.

As discussed above, the system of De Bijl analyzes overlapping frames of sampled audio data and compares the value of the central sample in the frame to each of the other samples in the frame to determine the number of samples in the frame that have a value greater than the central sample (De Bijl, col. 4, lines 36-54; col. 4, line 63 – col. 5, line 4-11). Accordingly, in De Bijl, the reference value to which each of the samples in the frame is individually compared is the value of the central sample. However, De Bijl does not disclose “counting a first quantity of the at least one

preceding signal section, a second quantity of the at least one high-energy signal section, and a third quantity of the at least one following signal section,” as recited in claim 1. Rather, each of the samples in De Bijl is independently compared to the central sample by a comparator, resulting in the output of a logic one or a logic zero for the sample, and *the total number of logic one's in the frame is counted* to determine if the central sample is an interference pulse (De Bijl, col. 5, lines 43-47).

For at least this reason, De Bijl does not anticipate claim 1, and the Assignee requests that the rejection of claim 1 be withdrawn. Claims 2-7 depend from claim 1 and are allowable for at least the same reasons. Thus, the Assignee respectfully requests that the rejections under 35 U.S.C. §102 be withdrawn.

ii. Independent Claim 8

Claim 8 as amended is directed to an apparatus comprising, *inter alia*, “a detection circuit configured to detect, among the plurality of signal sections, the occurrence of: at least one high-energy signal section having an energy content greater than the energy threshold, at least one preceding signal section preceding the at least one high-energy signal section and having an energy content less than the energy threshold, and at least one following signal section following the at least one high-energy signal section and having an energy content less than the energy threshold; **and a counting circuit configured to count a first quantity of preceding signal sections, a second quantity of high-energy signal sections, and a third quantity of following signal sections** (emphasis added).” Support for these amendments may be found at least at paragraph [0094] of the Applicant’s specification.

As should be appreciated from the foregoing, De Bijl fails to disclose or suggest counting a first quantity of preceding signal sections, a second quantity of high-energy sections, and a third quantity of following signal sections, but merely counts the total number of logic one’s output by the comparator circuit to determine if the central sample in the frame is an interference pulse.

For at least this reason, De Bijl does not anticipate claim 8, and the Assignee requests that the rejection of claim 8 be withdrawn. Claim 9 depends from claim 8 and is allowable for at least

the same reasons. Thus, the Assignee respectfully requests that the rejections under 35 U.S.C. §102 be withdrawn.

iii. Independent Claim 10

Amended claim 10 is directed to a computer-readable medium comprising a plurality of software code sections that, when executed by a computer, perform a method comprising, *inter alia*, “detecting, among the plurality of signal sections, at least one high-energy signal section having an energy content greater than the energy threshold, wherein the at least one high-energy signal section has at least one preceding signal section having an energy content less than the energy threshold and at least one following signal section having an energy content less than the energy threshold; **counting a first quantity of the at least one preceding signal section, a second quantity of the at least one high-energy signal section, and a third quantity of the at least one following signal section...**(emphasis added).” Support for claim 10 may be found at least at paragraph [0089] and claim 11 of the Applicant’s specification as originally filed.

As should be appreciated from the foregoing, De Bijl fails to disclose or suggest counting a first quantity of preceding signal sections, a second quantity of high-energy sections, and a third quantity of following signal sections.

For at least this reason, De Bijl does not anticipate claim 10, and the Assignee requests that the rejection of claim 10 be withdrawn. Thus, the Assignee respectfully requests that the rejections under 35 U.S.C. §102 be withdrawn. Claims 11 and 12 have been canceled without prejudice or disclaimer, thereby rendering their rejections as moot.

II. New Claims

Claims 13-20 are newly added to this application to further distinguish the Applicant’s contribution to the art. Claims 13-18 depend from claim 10 and claims 19 and 20 depend from claim 8. Each of these dependent claims is allowable for at least the same reasons as the base claim from which it depends.

III. General Comments on Dependent Claims

Since each of the dependent claims depends from a base claim that is believed to be in condition for allowance, for the sake of brevity, the Assignee believes that it is unnecessary at this time to argue the further distinguishing features of the dependent claims. However, the Assignee does not necessarily concur with the interpretation of the previously presented dependent claims as set forth in the Office Action, nor does the Assignee concur that the basis for rejection of any of the previously presented dependent claims is proper. Therefore, the Assignee reserves the right to specifically address the further patentability of the dependent claims in the future.

CONCLUSION

A Notice of Allowance is respectfully requested. The Examiner is requested to call the undersigned at the telephone number listed below if this communication does not place the case in condition for allowance.

If this response is not considered timely filed and if a request for an extension of time is otherwise absent, Applicant hereby requests any necessary extension of time. If there is a fee occasioned by this response, including an extension fee, the Director is hereby authorized to charge any deficiency or credit any overpayment in the fees filed, asserted to be filed or which should have been filed herewith to our Deposit Account No. 23/2825, under Docket No. N0484.70055US00.

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Respectfully submitted,

By 

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